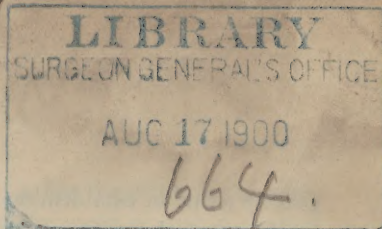


Smith (D.D.)



## THE DENTAL PULP—ITS OFFICE AND ECCENTRICITIES.

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SOME months ago there was a talk made before the Odontological Society of Pennsylvania, more from a practical than a scientific standpoint, on the office of the dental pulp. In the discussion that followed, a wish was expressed that the subject-matter of that talk might be embodied in a paper to be read before the American Dental Association. In accordance with that wish, the following has been gathered up for this occasion.

It is hardly to be expected that there can be presented to a body of dentists of to-day anything specially new upon the office of the dental pulp. It is possible, however, in grouping well-known phenomena in an unaccustomed manner, to get a new view of an old subject, as we might take a picture which had hung neglected for a long time because of an unsatisfactory light, and by re-hanging so change the light thrown upon it as to make it appear like a new picture. All we can hope to do at this time, in looking at the office of the dental pulp, is to present certain phenomena and facts in new groupings, and possibly to hang the old picture in a better light. It is not the purpose of this paper to study the etiology of the teeth, or to look minutely at the different formations uniting to make up a tooth, as the enamel, dentine, and cementum; neither is it to treat of pulp-action in the original formation of these structures. The intention is rather to speak of the part the pulp plays in the economy of tooth solidification and of the deductions therefrom. It is well known that the different formations which make up the body of the tooth receive life and nourishment from two distinct sources,—the one from the pulp, and the other from the pericementum of the root. The full apprehension of this fact and the phenomena arising from it will

greatly assist in establishing rational and substantial methods for the treatment and saving of teeth. The pulp is the central figure, the important factor of every tooth. To it is committed the care of the newly-erupted tooth, and its office work is to readjust, recalcify, consolidate, strengthen, and sustain the enamel and dentine. Observers will doubtless agree with the proposition that, as a rule, the earlier a tooth is developed the more readily it yields to decay, and the more time taken for calcification before eruption the greater the resistance to decay manifested on the part of the tooth. The young tooth being frequently erupted into environments which are most unfavorable to its preservation, there begins at once a contention between the forces acting externally to destroy it and the vital forces of the pulp to protect it from within ; and just in proportion as the pulp is able to do its office-work of nourishing, consolidating, and sustaining the exposed parts, will the crown at this period be protected from decay. Hence the emphasis that should be placed on keeping the pulps of young teeth in a condition of healthful activity.

The law of *use* governing tooth consolidation, widely known and rigidly observed among patients, would probably do more to arrest the extensive decay now prevalent, between eight and fifteen years of age, than dentistry can ever accomplish by mechanical methods.

In general terms, under *fifteen years* is the period of life when the foundation is laid for the character, good or bad, of the denture. Too much importance has been and is attached to *inheritance* as determining the character of the teeth. Standing in advance of inheritance, for children, is *use* of the teeth in mastication. Natural and healthful mastication will alone force that exercise of the teeth, required by the pulp and the peridentium ; and it is the true cleanser of the mouth and teeth. The more thorough this function, the less the necessity for dentifrices and brushes.

The sixth-year or first permanent molar, erupting at an age when little thought or care is given to the teeth, is commonly the one over which the hardest battle for preservation is fought. The *importance* of saving these teeth has practically ceased to be a subject for discussion. The effort should be to save them, but with living pulps.

Devitalization of the pulp at an early period of life carries with it a more or less rapid retrogressive change in the quality of tooth-material, and that without power to arrest it. Fillings may prolong the existence of the tooth as such, but with the arrest of vitality in the pulp there is cessation of all vital sustaining action, which hitherto



assisted in its preservation ; and not only so, but the imperfectly calcified enamel and dentine already built into the tooth is now in contact with devitalized connective tissue, which, in the imperfectly consolidated tooth, becomes itself probably a source of disintegration and assists in its destruction. What has been said of the sixth-year molar may also be said of all other of the young permanent teeth. The pulp being to the erupted tooth, whether temporary or permanent, the only source of life, of sustenance, and of reforming changes, it is of the first importance that it be maintained in a condition of health ; and as this condition surely exists only when the pulp is protected in its own natural and proper covering, the dentine, all encroachments upon it through decay or manipulation should be carefully guarded. Its preservation in full activity means the deposition of new and better material, although parts of the crown may have been cut away or destroyed by decay.

It has been said that the pulp is the only medium through which the enamel and dentine of an erupted tooth are compacted, consolidated, and changed into decay-resisting material. While thus defining pulp-action in this paper, the author would suggest that it seems more than probable that the future may discover that the action of the pulp is not confined to enamel and dentine alone, but that it extends a consolidating influence into the territory of the cementum, inciting in it changes whereby the true bone, which covers the root in the young tooth, is converted into a tissue resembling dentine more than cementum.

Isolated instances of the action of the pulp, in re-arranging, depositing, and solidifying the materials of the dentine and enamel of a young tooth, are in the minds of all men of experience and observation, but are we not prone to think of such instances as exceptional or as anomalous rather than as the true expressions of the law of pulp-action? Are not our literature and the teachings of the past and present wanting, in that a position of supreme importance is given to operations on the externals of the tooth, while overlooking the significant aid of that living factor within the walls of the pulp-cavity? And would it not be more in harmony with the true science of tooth-saving to emphasize the matter and the manner of *pulp-protection* in young life?

There is another question upon which dental literature and, so far as we know, dental teachings are silent. It is this : Does there ever come to a tooth a period when its pulp, with all this importance attach-

ing to it in early life, can be dispensed with? It is the contention of this paper that a pulp which has maintained a healthful existence in a tooth to a period of perhaps twenty-five or thirty-five years of age has accomplished for that tooth all that it will or can do in the way of consolidating, strengthening, and solidifying its osseous structures. The maximum of density is reached, we may say, with full maturity. From this time the pulp forms a part of the tooth which can be readily dispensed with. It has done its work, often much better than it was feared it would. If it remains within the tooth, there is an unmistakable restriction of its function and a limiting of its activities, and sometimes there seems to be mischievous interference with the usefulness of the tooth. Having completed its office work of consolidating the structures it was set specially to guard, it will sometimes begin to build in upon itself, circumscribing its boundaries, or to deposit nodules of enamel or dentine, pulp-stones, sometimes ossifying the whole coronal portion, and sometimes even sending out notice of the mummifying of its entire substance by ejecting into the tubuli and the connective tissue of enamel and dentine an offensive coloring matter, which baffles all efforts for its removal. But this is not all. Later in life do we not find teeth which have been decay-resisting for fifty or sixty years, seemingly changing in structure, assuming apparently a state of partial decalcification, returning again to conditions of childhood, as evidenced by their yielding more readily to decay? Continuing on a little farther, a few years more perhaps, it is not uncommon to find that decay has become extensive throughout the remaining teeth.

Along the gum-margin, particularly of the front teeth, where fillings have preserved the teeth for twenty years perhaps, around these fillings the teeth are beginning to break down,—and if we cut into these teeth now, we find a change in the structure, a change that is not imaginary; it is real. The tooth has softened; if refilled with gold, in a comparatively short time it begins to darken around the fillings. The very best that can be done with our metallics, they will no longer arrest decay as they had previously done. Now what has brought about this change? Is it not the living organism, the pulp that previously built and consolidated the osseous structures of the crown? The same pulp, after a period of practical inactivity, is again at work, but it is now transforming the compact material which it placed in that tooth into a condition wherein it yields much more readily to decay. Now, what are the practical deductions from this



action of the pulp? Suppose we take a tooth at the period of life when it is at its best, when the dentine and enamel are well and strongly consolidated, and destroy the pulp, what will be the result? One result certainly must follow. By no vital process can there be, later in life, any change of the compacted materials of the dentine and enamel into any better or poorer formations. As the tooth is when the pulp is destroyed, so it must remain, except as to those changes which take place through the gradual disintegration of the internal structures of all pulpless teeth. Have we injured the tooth in any material degree? What is the prognosis of a tooth with pulp destroyed at the period of maximum consolidation? With present methods of treatment, who would venture the prediction that a pulpless tooth would not continue in service to the end?

If, now, the pulp is so important at one period of life and of so little importance at another,—if it is, indeed, a builder in early life and may be a source of disintegration in old age,—shall we not revise our estimates of the value of the dental pulp? and does it not open up possibilities for service, both in teaching and operating, in fields hitherto uncultivated?

One other point this paper would simply hint at, with a view of opening it up for investigation and discussion. It has been said that the future may demonstrate as a fact, what is yet but conjecture, that the action of the pulp in rebuilding the osseous structures of the tooth is not confined in its operations to dentine and enamel, but that it extends an influence more or less potent into the territory of the cementum, depriving it in some of its parts of much of the characteristics of bone-structure. If, now, this be so, there comes at least a suggestion respecting some of the unexplained manifestations of pyorrhea alveolaris. In this connection our first remark is: Pyorrhea is seldom or never found in connection with young teeth; it seems to be emphatically a disease of adult life, generally of middle life. Second: It is an affection not found in connection with soft teeth, nor in mouths with teeth much given to decay. So true is this, that in typical cases of pyorrhea it may be said there is no decay in the teeth. Third: It is never found in connection with devitalized teeth, where devitalization preceded the manifestation of the disease. In a mouth with extensive and uncontrollable pyorrhea it will be noted that the disease is confined to the strong, well-formed teeth, exempt from decay (not necessarily unfilled), but with living pulps.

Our deductions are : If it should hereafter be found that the pulp sends a consolidating tendency or influence into the territory of the cementum, rendering it obnoxious to the pericementum, because of too great consolidation, there will be formed favorable conditions for the beginning of pyorrhea, and we shall find in it the probable solution of the exemption of pulpless teeth from this disease,—why young teeth are not affected, and why pyorrhea is pre-eminently a disease associated with the hard, strong teeth of adult life.

It is of vital importance that the cementum should be kept unimpaired and unchanged. The preservation of the pulp in a mature, well-calcified tooth is not a matter of so much concern, for whatever the conditions of the crown, *it* can be restored if the cemental structures of the root are in normal condition. But a tooth which has lost its support, through absorption of process and withdrawal of peridentium, can never be restored to usefulness.

From the foregoing we must conclude that the dental pulp is an organ of the greatest importance up to the period of full tooth-consolidation. After that, for a considerable period, as it would seem, it is of little service to the tooth, and, later in life, it may even become a source of injury and trouble.

Of the gentlemen who have written of pyorrhea, no two seem to agree as to its etiology or methods of treatment. Age has not been regarded as a factor of any importance in connection with it. I do not remember that character or quality of the tooth-material has ever been considered as having any bearing on its origin or prognosis. It has been treated of as a disease of local or constitutional origin according to the views of the writer, the inference being that it may occur in the mouth of the child of twelve or fifteen years as in the adult of thirty to forty-five ; but from the foregoing it would seem that investigations must extend to embrace age, tooth-structure, and pulp-action, as well as local irritants and constitutional vice, before it can be said that the origin of this troublesome concomitant of dental practice is satisfactorily defined.





